Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

ON GAUSS'S METHOD OF ELIMINATION.

By Prof. Asaph Hall, Georgetown, D. C.

In the original normal equations the diagonal coefficients are positive, being the sums of squares. By Gauss's method of elimination the diagonal coefficients of the first reduced normals are $[bb\,.\,1]$, $[cc\,.\,1]$, etc., and we might infer from symmetry that these also are positive; this may be shown as follows:

$$[bb\,.\,1] = [bb] - \frac{[ab]^2}{[aa]} = \frac{[aa]\,.\,[bb] - [ab]^2}{[aa]}\,.$$

Let μ = number of equations of condition = 2; the numerator becomes

$$(a_1^2 + a_2^2)(b_1^2 + b_2^2) - (a_1b_1 + a_2b_2)^2 = (a_1b_2 - a_2b_1)^2\,.$$

Let $\mu = 3$.

$$(a_1^2 + a_2^2 + a_3^2)(b_1^2 + b_2^2 + b_3^2) - (a_1b_1 + a_2b_2 + a_3b_3)^2$$
$$= (a_1b_2 - a_2b_1)^2 + (a_1b_3 - a_3b_1)^2 + (a_2b_3 - a_3b_2)^2\,.$$

Let $\mu = 4$, and the numerator is

$$(a_1b_2 - a_2b_1)^2 + (a_1b_3 - a_3b_1)^2 + (a_1b_4 - a_4b_1)^2 + (a_2b_3 - a_3b_2)^2$$
$$+ (a_2b_4 - a_4b_2)^2 + (a_3b_4 - a_4b_3)^2\,.$$

This process can be continued, and for μ = a whole number the numerator will reduce to a sum of squares. Hence the value of $[bb\,.\,1]$ is positive, and of course the similar coefficients in the first, second, third, etc., reduced normals are positive. The reduction is symmetrical, and for a given value of μ we can infer the number of squares of determinants of the second order which will form the numerator. See Annals of Mathematics, Vol. VII, p. 65.

EXERCISE.

358

A hemispherical bowl, external and internal radii R and r, has a sphere of the same material, radius a, suspended from the edge of the rim. Determine the inclination of the bowl to the horizontal plane on which it stands. [*Artemas Martin.*]